MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

EET1156 – BASIC ELECTRICAL TECHNOLOGY

(ME)

6 MARCH 2018
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This exam paper consists of only six printed pages, including this cover page.

2. Answer all questions.

3. Write all your answers in the answer booklet provided.

Question 1

a) Solve for all the mesh currents for the circuit shown in Figure Q1.1

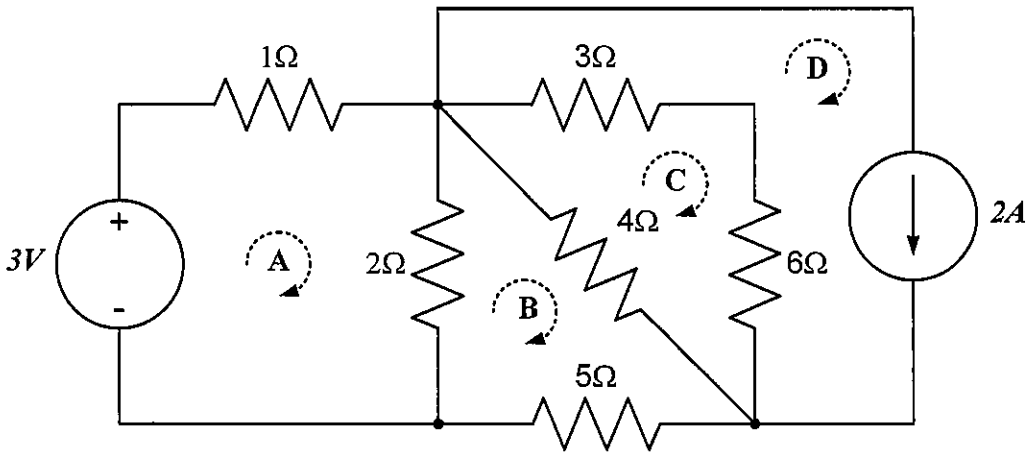


Figure Q1.1

[10 marks]

b) Determine the Thevenin's equivalent circuit to the terminals a-b for the circuit shown in Figure Q1.2. Then calculate the power dissipated by a 4Ω-load if it is inserted at the terminals.

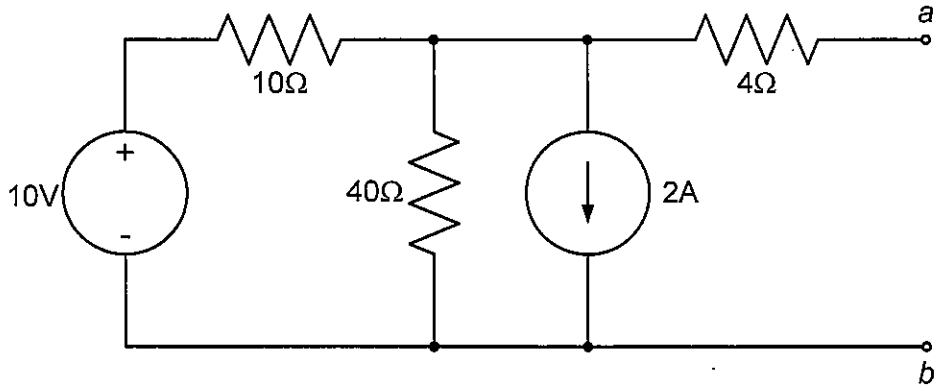


Figure Q1.2

[10 marks]

Continued...

Question 2

a) A capacitor is made of 2 parallel metal plates separated by sheets of mica having a thickness of 0.3 mm and a relative permittivity of 6. If the area of each plate is 500 cm^2 and 500 V is maintained across the terminals of capacitor, determine:

(i) Capacitance
(ii) Charge
(iii) Electric field strength
(iv) Electric flux density

(2 + 2 + 2 + 2 marks)

b) Why is there a need to insert dielectric material between the two plates of a capacitor?

(2 marks)

c) Figure Q2 shows a rectangular magnetic core with an air-gap which the flux density of air gap, $B_g = 1.2$ T. Given $N = 400$ turns and μ_r (iron) = 4000 and $\mu_o = 4\pi \times 10^{-7}$. The fringing effect is negligible. Find the exciting current of the core.

(10 marks)

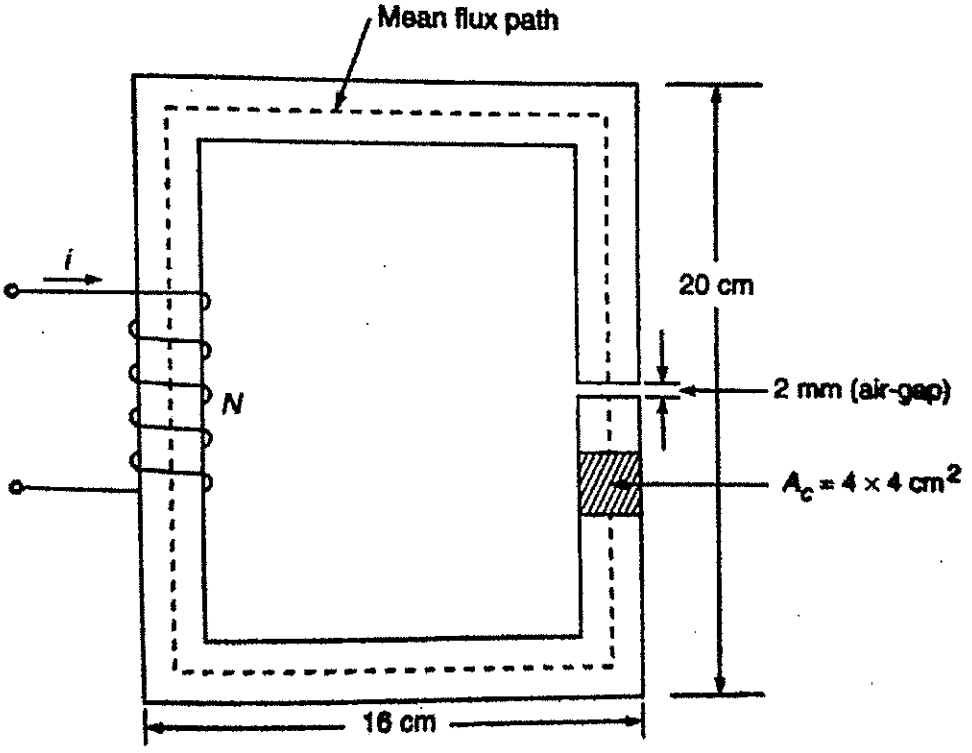


Figure Q2

Continued...

Question 3

a) Given the circuit in Figure Q3.1, determine I_o using mesh analysis

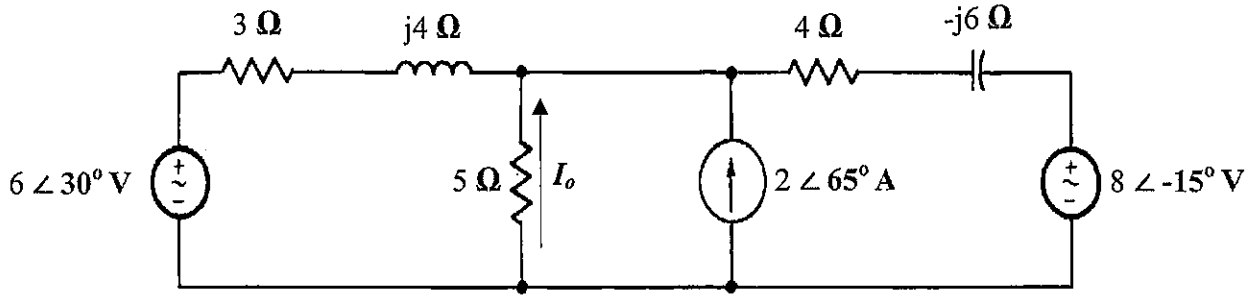


Figure Q3.1

[10 marks]

b) In the circuit of Figure Q3.2, calculate the overall impedance and V_{ab}.

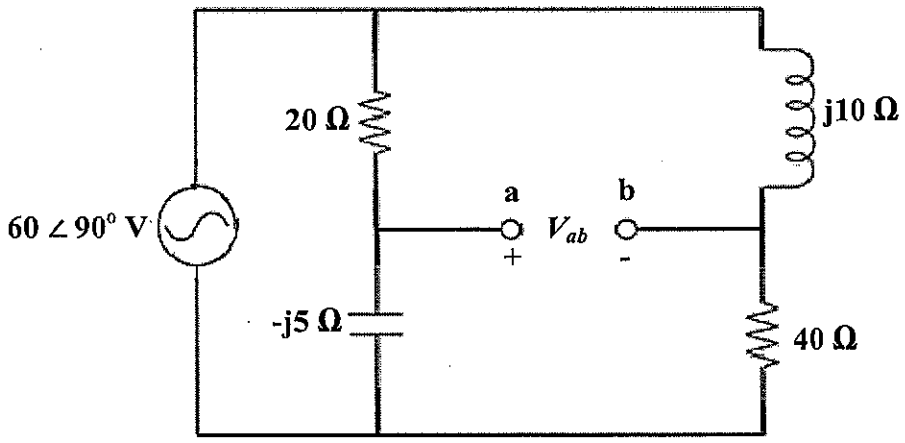


Figure Q3.2

[10 marks]

Continued...

Question 4

a) Given the circuit in Figure Q4.1, with assumption that the diode is ideal, determine:
   i) The waveform illustration of input and output
   ii) The current, i, flowing through the load R_L
   iii) The RMS load voltage, $V_{o(\text{rms})}$ and the RMS load current $I_{o(\text{rms})}$
   iv) The average power through the load resistor, $P_{o(\text{DC})}$ and the power absorbed by the load $P_{o(\text{rms})}$
   v) The frequency and period of the output voltage, f_o and T_o

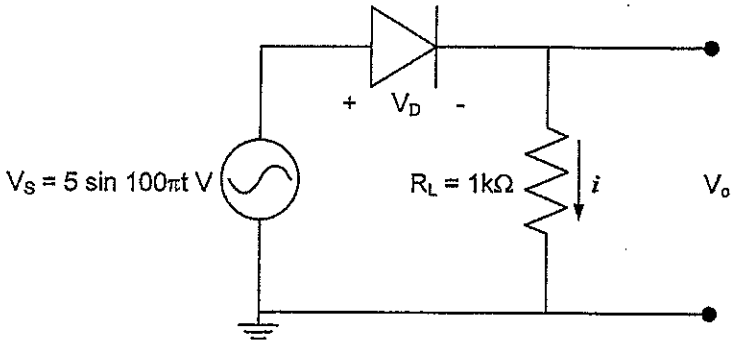


Figure Q4.1

[2 + 2 + 2 + 2 + 2 marks]

b) Given the circuit in Figure Q4.2, calculate the v_o and i_o.

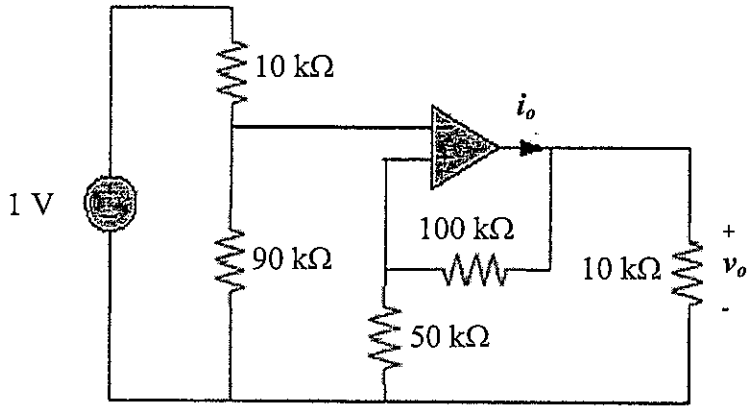


Figure Q4.2

[7 marks]

Continued...

c) Given the common-emitter BJT circuit in Figure Q4.3 with the following parameters: $V_{BB} = 4$ V, $R_B = 220$ kΩ, $R_C = 2$ kΩ, $V_{CC} = 10$ V, $V_{BE} = 0.7$ V and $\beta = 200$. Calculate:
i) The base, collector and emitter current (I_B, I_C and I_E)
ii) The V_{CE}

[6 + 2 marks]

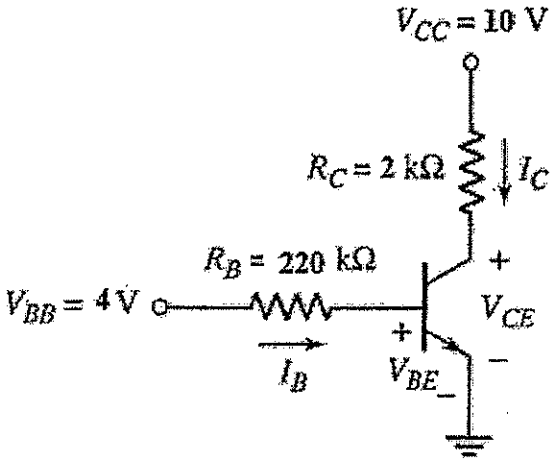
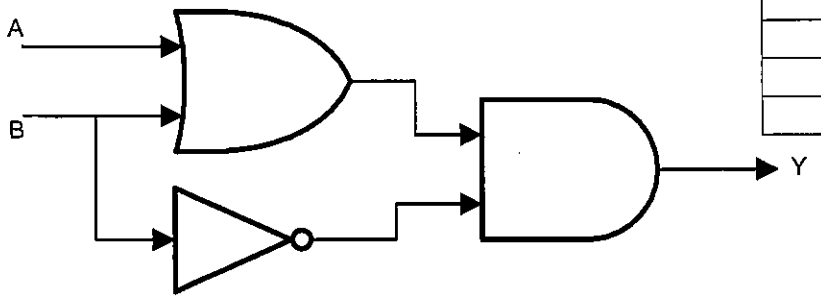


Figure Q4.3

Question 5

a) Obtain the expression of the logic circuit in Figure Q5 and complete the truth table.



A	B	Y

Figure Q5

(6 marks)

b) Simplify the logic expression below using Karnaugh-map

$$Y = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + ABC$$

(9 marks)

End of Paper